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DEPARTMENT OF FISH & GAME

Robert L. Salter, Acting Director

FEDERAL AID TO FISH AND WILDLIFE RESTORATION

Job Performance Report

Project F-71-R-4

REGIONAL FISHERY MANAGEMENT INVESTIGATIONS

Job No. 1-a.	Region 1 Mountain Lakes Investigations
Job 1-b.	Region 1 Lowland Lakes Investigations
Job 1-c.	Region 1 Stream Investigations
Job 1-d.	Technical Guidance

Period Covered: 1 January 1979 to 31 December 1979

by
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May 1980

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JOB PERFORMANCE REPORT

State of Idaho Name: REGIONAL FISHERY MANAGEMENT INVESTIGATIONS

Project No. F-71-R-4

Title: Region 1 Mountain Lake Investigations

Job No. I-a

Period Covered: 1 January 1979 to 31 December 1979

ABSTRACT

Time did not permit any high mountain lake investigations during 1979.

JOB PERFORMANCE REPORT

State of Idaho Name: REGIONAL FISHERY MANAGEMENT INVESTIGATIONS

Project No. F-71-R-4

Title: Region 1 Lowland Lake Investigations

Job No. I-b

Period Covered: 1 January 1979 to 31 December 1979

ABSTRACT

We placed two Lake Merwin traps in Coeur d'Alene Lake and captured 2,109 kokanee. We collected 229,174 eggs which will be used in enhancement programs at Pend Oreille Lake.

We collected 1,451,380 kokanee eggs at Granite Creek on Pend Oreille Lake. Resultant fry will be released in late July as part of our kokanee enhancement efforts. An economic evaluation of the Pend Oreille Lake fishery reveals significant benefits to the local economy. The cash value of the harvest on Pend Oreille Lake is estimated at $151,107. in 1979.

We operated an upstream trap on Hayden Creek, tributary to Hayden Lake, and estimated the spawning run to include 1,153 wild cutthroat and equal or greater numbers of Kings Lake cutthroat, 365 wild rainbow and 274 hybrids. Four-year old Kings Lake cutthroat averaged 371 mm (14.6 in) in length at time of spawning, having grown 254 mm (10 in) in 2 years of life in the lake. In 1979 anglers fished an estimated 20,778 hours to harvest 1,431 trout at a rate of 0.07 fish per hour.

We conducted extensive electrofishing sampling of Fernan Lake largemouth bass populations. We collected 1,583 bass and estimated a population size of 11,085 bass 2 years of age and older. We estimate a standing crop of 7.2 kg/ha (for bass 2+ and older). Bass in Fernan Lake are extremely slow growing and do not attain 305 mm (12 in) in length until age 4+.

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RECOMMENDATIONS

1. Place two Lake Merwin traps in Coeur d'Alene Lake during the fall of 1980 to collect kokanee spawn.

2. Trap Sullivan Springs and collect kokanee eggs, incubate and rear for mid-summer releases in 1981.

3. Continue to monitor progress of Hayden Lake program including:

Numbers, size, timing and percent of wild and hatchery fish in spawning and downstream migrations in Hayden Creek.

Hatchery facilities, feeds and techniques necessary to pond rear 300,000 2-year old Kings Lake cutthroat 152 mm '6 in) in length. Released fish must be capable of growth rates and survivals comparable to those in the 1979 release.

OBJECTIVES

Obtain data on fish population in lowland lakes in Region 1 including: use and harvest, spawning trends, stocking success and return to the creel.

Continue implementation of a management plan for Hayden Lake and monitor results to date.

Artificially enhance kokanee populations in Priest and Pend Oreille Lakes by trapping adult kokanee at Sullivan Springs and Coeur d'Alene Lake, taking spawn, artificially incubating and rearing until mid-July when resultant fry are released in Sullivan Springs on Pend Oreille Lake and Granite Creek on Priest Lake.

Renew "feral" Kamloops broodstock at Clark Fork Hatchery by obtaining wild eggs from adults entering the Clark Fork River.

TECHNIQUES USED

Non-systematic creel census, fish population sampling including electro-fishing, netting, trapping, spawning surveys, angling, snorkeling, fish culture and relocation and a variety of contacts with agencies and individuals were used to manage fish populations in several lowland lakes in Region 1 during the study period.

FINDINGS

Coeur d'Alene Lake

In order to obtain kokanee eggs for population enhancement efforts at Priest and Pend Oreille Lakes, we placed two Lake Merwin traps in Beauty Bay on 7 November 1979. Between 7 November and 1 January 1980 we trapped 2,109

kokanee and collected 229,174 eggs. Trapping was hampered by heavy winds in December which caused trap movement. Peak catches occurred on 14 December (Fig. 1) when we caught 223 kokanee on the east shoreline. We also enumerated other species captured through 3 December. Those include:

Species	Number
Brown bullhead	317
Black crappie	175
Yellow perch	119
Largemouth bass	20
Tench	19
Pumpkinseed sunfish	9
Rainbow trout	4
Cutthroat trout	4
Squawfish	1

Pend Oreille Lake Kokanee

Enhancement

As we reported previously, it is our goal to enhance the Sullivan Springs run through artificial incubation and late releases to a size which will provide 10-50 million eggs annually (Goodnight, Mauser 1978, 1979).

In 1974, 1976, 1977 and 1978 eggs were taken from this run, incubated in North Idaho hatcheries and resultant fry released the following summer in Sullivan Springs.

Date released	Location	Number
5/8-6/19/75	Sullivan Springs	629,222
7/11-7/28/77	Sullivan Springs	757,720
6/22-8/4/78	Sullivan Springs	1,735,251
7/18-8/24/79	Sullivan Springs	1,763,734

During November and December 1979 we collected 1,451,380 eggs at Sullivan Springs. Resultant fry will be released at that site in the summer of 1979. We also collected 229,174 eggs in Coeur d'Alene Lake during November and December. Resultant fry from these eggs will also be released in Sullivan Springs.

1977 releases were the first ones made from mid- to late-July at a time when food availability would enhance survival potential. Survival estimates were not attempted for this release, but survival estimates were made for similar releases which were made in July 1978. Bowler et al. (1979) estimated that of those eggs collected to provide the 1978 fry releases, 12.3% survived to the fall of 1978 which is 10 times the estimated wild survival. They further estimate survival of these same fish to the fall of 1979 was 82% compared to 70% for wild fish of the same year-class. This survival enhancement is our basis for attempts to enhance the run size in Sullivan Springs. If survival of 1977 releases was similar to that estimated for 1978 releases, we should see a significant increase in the Sullivan Springs run size in 1980. Since the age

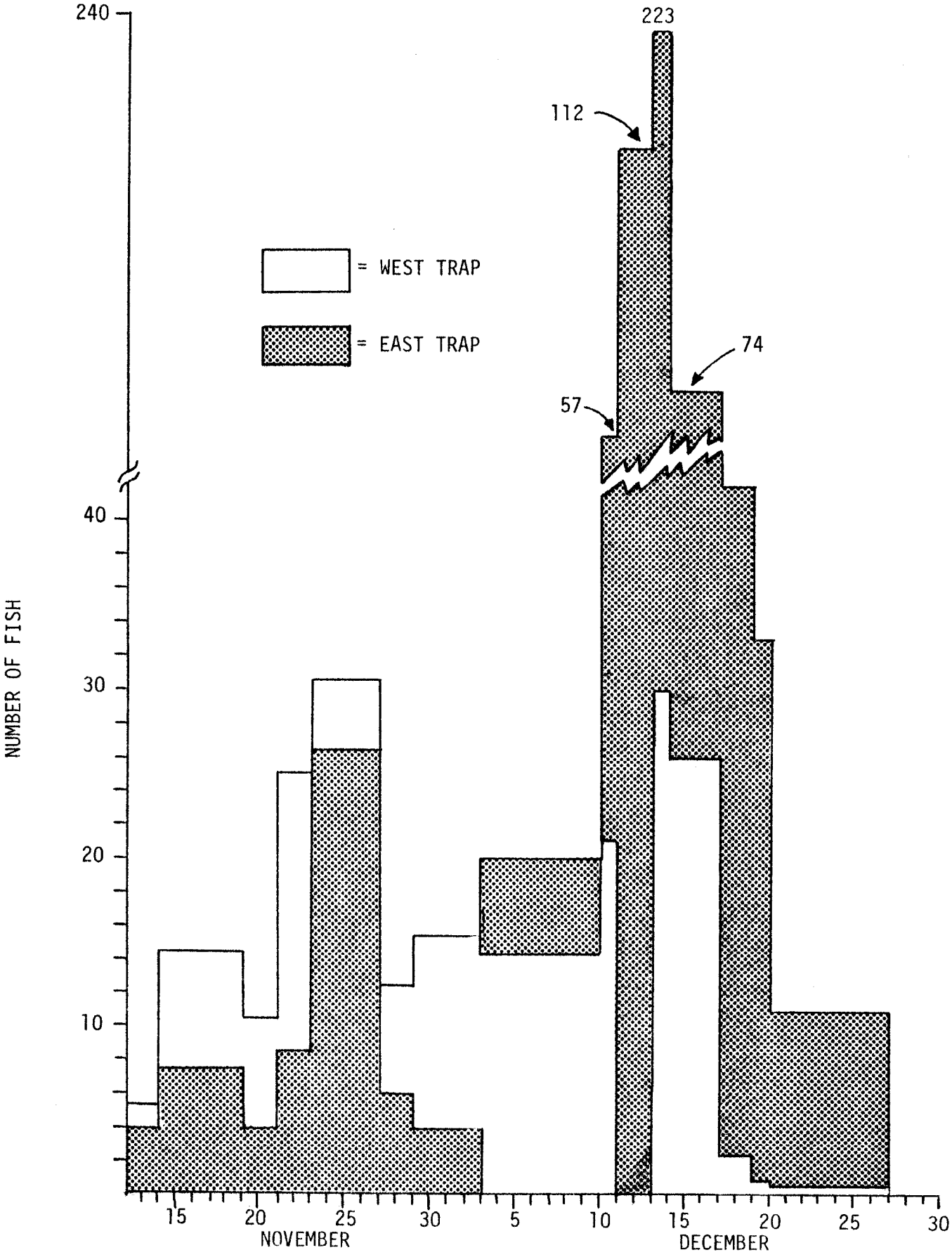

Figure 1. Average number of kokanee per day captured in Lake Merwin traps, Beauty Bay, Coeur d'Alene Lake, November

composition of spawners in Sullivan Springs varies considerably, we can expect from 32-85% of the surviving 1977 releases to spawn in 1980 as 4-year olds (Bowler et al. 1979). Greater enhancement of run size should logically occur in 1981 when the 4-year old segment of the 1978 release (a large release--1.6 million) returns, along with the 5-year old segment of the 1977 releases. Should we not see significant enhancement of run size in the next 2 years, we would have to seriously reconsider management direction for Pend Oreille Lake.

Although 1975 releases were made earlier than our current evidence would indicate would provide optimal survival (mid- to late-July), there is some evidence that these releases did enhance the 1978 run size. Although shoreline spawning escapement observations in 1978-79 were only 13% of the previous 6-year average, and overall tributary spawning observations except Granite Creek in 1978-79 were only 45% of the previous 6-year average, the Granite Creek run size was 115% of the previous 6-year average (Table 1).

Furthermore in 1974 we counted 13,549 kokanee through the Sullivan Springs weir. In 1978 we spawned an estimated 16,875 fish. This represents a 25% increase. All this would indicate some mechanism has served to offset declines that would otherwise have been expected. Hopefully that mechanism was our hatchery treatment of embryos in the 1974-75 run.

Pend Oreille Lake Economic Evaluation

Bowler (1979) has reported the net economic value of the Pend Oreille fishery at $2,337,030. This represents "willingness to pay" or the value of the fishery to anglers. In seeking community support for state and federal funding for expansion of kokanee incubation capacity in North Idaho, I felt it important to more graphically and directly relate the benefit of the fishery to the local economy. During January of 1979 I contacted businessmen in the Sandpoint-Pend Oreille Lake area and asked their assessment of how the fishery impacts their business.

Marina and resort operators attribute 85-95% of their boat moorage business directly to the fishery. A partial survey of moorage on the lake indicates a minimum of 1,150 slips yielding $245,450 income annually.

Marina owners also attribute 85-90% of their boat sales directly to the fishery. Many commented that although purchasers had other uses in mind for their boats the primary motivating factor for purchase was to fish the lake. In 1978, four marinas that we surveyed (there are more) sold $1,217,000 worth of boats.

Two sporting goods stores estimate 25% of their retail sales are specifically for tackle for Pend Oreille Lake fishermen. In 1978 this amounted to $150,000 for those two stores.

The development of the phenomenal fishery on Pend Oreille Lake during the 50s led to the development of resorts which cater specifically to fishermen. The Trestle Creek community on the north end of the lake is an excellent example. Four resorts there cater primarily to nonresident retired fishermen who spend the summer in the area. These resorts house 650-700 full time summer

Table 1. Comparison of maximum single spawner counts made in various spawning areas of Pend Oreille Lake in 1978-79, with previous 6-year average (expressed as percentage) (from Bowler et al. 1979).

Area	Maximum single counts by spawning year							
	72-73	73-74	74-75	75-76	76-77	77-78	6-Yr Ave	78-79
Lakeshore	2,669	19,834	7,001	9,231	1,640	3,490	7,310	936
						% of previous 6-yr ave. represented by 78-79 count = 13%		
Tributaries (other than Granite Creek)	6,566	12,091	21,513	5,185	3,291	5,186	8,972	4,064
						% of previous 6-yr ave. represented by 78-79 count = 45%		
Granite Creek	5,733	10,631	20,672	27,672	27,453	10,717	20,075	18,225
						% of previous 6-yr ave. represented by 78-79 count = 115%		

residents in over 300 trailer spaces. These people eat in local restaurants frequently and make many major purchases in the area.

In 1978 four Sandpoint auto dealers sold them 24 vehicles worth over $180,000. Four local marinas sold them 34 boats worth over $120,000.

Aside from the recreational value of the fishery to anglers on Pend Oreille the yield of the fishery does provide partial sustenance to many local residents and the cash value of the harvest is significant. Based on $2.00/lb for trout species, and $3.00/lb for kokanee, I estimate the cash value of the harvest for 1978 at $151,107.

Hayden Lake

In 1979 we trapped Hayden Creek with picket-weirs to enumerate spawning trout and take eggs from 4-year old Kings Lake cutthroat released in 1977. Between 14 March and 16 May we caught 672 adult fish in our upstream traps. These included 263 Kings Lake cutthroat, 236 wild cutthroat, 92 rainbow-cutthroat hybrids, 75 wild rainbow and 6 hatchery rainbow released as catchable-size fish prior to 1977.

Estimated run sizes of wild fish from mark-recapture ratios at a down-stream trap were 1,153 wild cutthroat, 365 wild rainbow and 274 hybrids. Since Kings Lake cutthroat were caught in slightly greater numbers than wild cutthroat we could assume similar run sizes unless timing was such that more wild fish migrated around the weir during periodic uncontrolled high flows. Using the available estimates as calculated, total run size would have been in the neighborhood of 3,000 fish.

In 1977, a low water year, we trapped 637 trout, most of the run. We estimated cutthroat run size at about 500 fish. Figures for 1979 would in-dicate a doubling of cutthroat numbers and a four-fold increase if cutthroat of hatchery origin are included in the comparison.

In 1971, wild cutthroat ranged from 310-460 mm (12.2-18.1 in) with a modal size of 390 mm (15.4 in) (Fig. 2). Hybrids measured 220-690 mm (8.7-27.2 in) with a modal size of 410 mm; wild rainbow were 150-600 mm (5.9-23.6 in) with a mode of 410 mm.

Four year-old Kings Lake cutthroat spawners showed a size distribution of 330-420 mm (13.0-16.5 in) with a modal size of 370 mm (14.6 in) (Fig. 3). A small number of fish measured 290-310 mm (11.4-12.2 in). These may have been 3-year olds from the 1978 release of 36,982 fish. Both age-groups were marked by removal of the adipose fin prior to release.

1975 year-class Kings Lake cutthroat averaged 371 mm (14.6 in) at time of spawning, having grown 254 mm (10 in) in 2 years of life in the lake. A run of 1,285 fish would represent a 4.3% return from the 1977 release of 30,000 two-year olds. In fall 1978 we estimated roughly half of the 1975 year-class of Kings Lake cutthroat in Hayden Lake would spawn for the first time as 5-year olds in 1980. We also expect the first return of 4-year old fish along with repeat spawning of some percentage of 5-year olds. A permanent weir will allow us to completely enumerate the run for the first time in 1980.

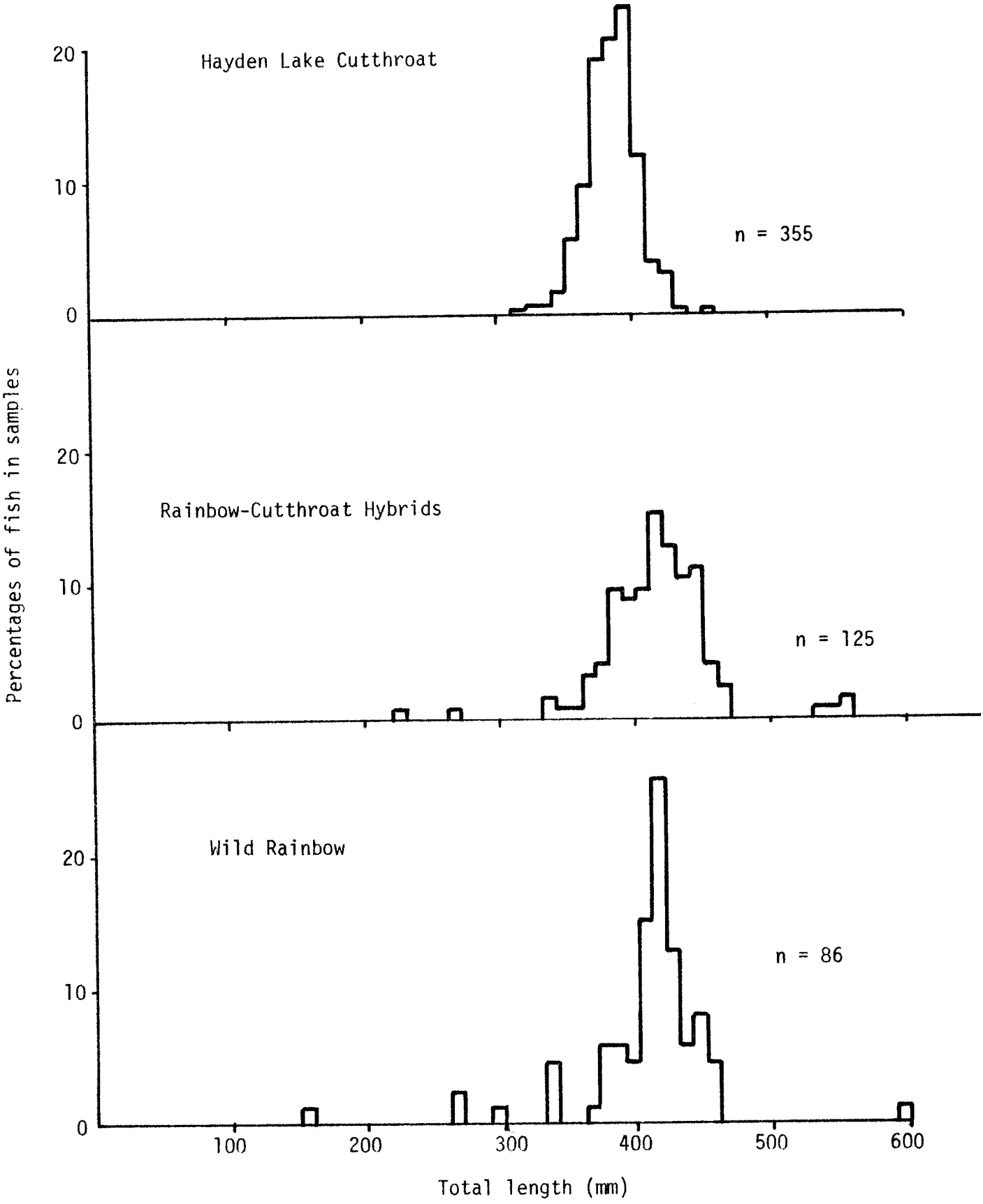

Figure 2. Size distributions of wild trout spawners in Hayden Creek, 1979.

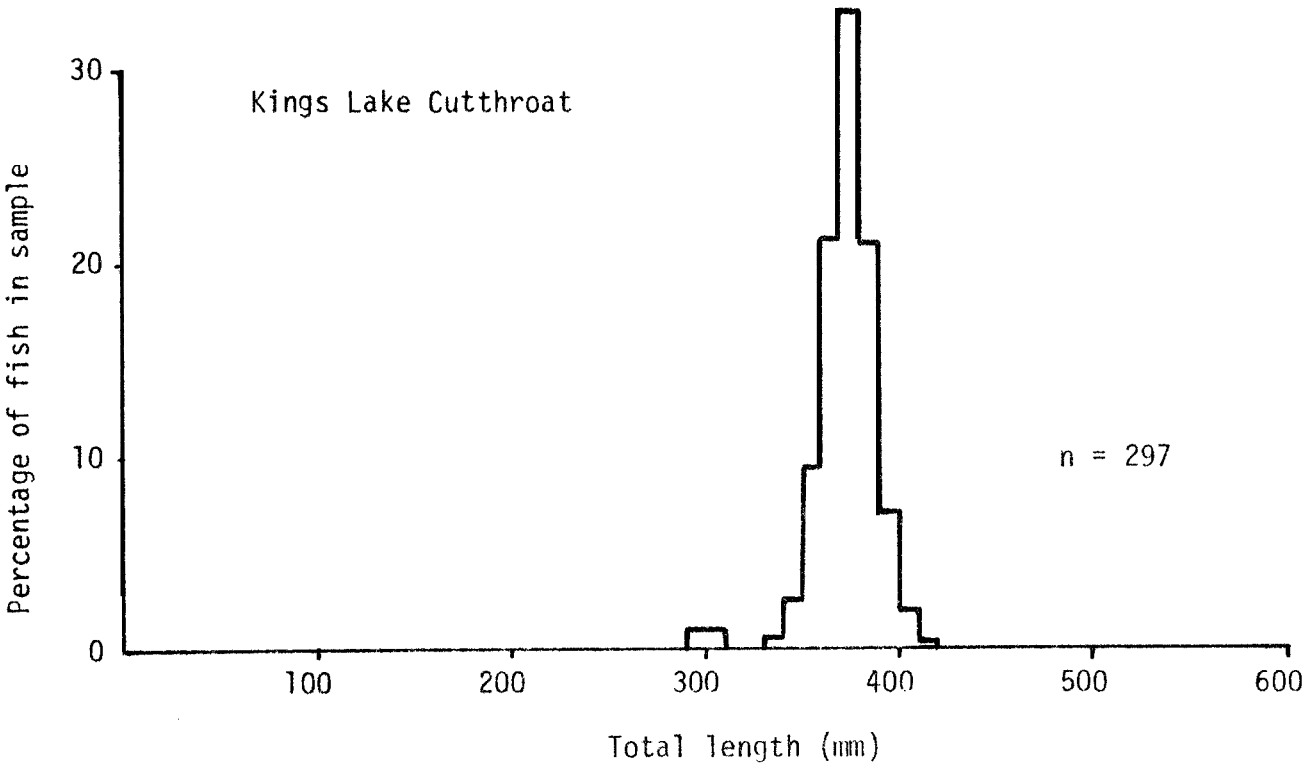

Figure 3. First return of 1975 year-class westslope cutthroat to Hayden Creek in 1979.

From 28 Aprul to 30 November 1979 we conducted a boat count-angler interview creel census on Hayden Lake. We divided the season into 14 intervals of 14 days and 1 interval of 21 days (Table 2). We censused all holidays plus 2 weekdays and 2 weekend days selected at random each interval.

We divided each count day into three equal periods based on the mean number of daylight hours for each interval. A time for a boat count was randomly selected from the three periods. Counts of all boats fishing the lake were made at the designated times.

The mean number of boats per day multiplied by the number of daylight hours and the number of weekend, week and holidays provided an estimate of total boat hours. The mean number of anglers per boat supplies total hours when multiplied by total boat hours. The catch rate for each type of fish, obtained from angler interviews times angler hours gave the harvest estimate.

In 1979 anglers fished Hayden Lake an estimated 20,788 hours to harvest 1,431 trout at a rate of 0.07 trout/hr (Table 2). The harvest consisted of 530 wild cutthroat which averaged 396 mm (15.6 in) in length, 326 hybrids which averaged 411 mm (16.2 in), 309 wild rainbow averaging 414 mm (16.3 in), and 266 Kings Lake cutthroat with a mean size of 386 mm (15.2 in). Harvest of fish smaller than the 356-mm (14-in) minimum size limit was relatively insignificant as detected by routine angler interviews.

Seventy percent of 268 anglers interviewed while fishing Hayden Lake were Idaho residents and only 33% of 243 contacts owned a cabin on the lake.

Another 75% of those interviewed said they were familiar with special regulations (2 trout, none under 14 inches) and our program to enhance the Hayden Lake cutthroat fishery (232 respondents).

Of 199 people interviewed 86% were in agreement with the program, however 46% of 156 contacts felt fishing was poor (23% good, 23% fair, 8% no opinion) and 42% of 118 people interviewed thought the trend was toward poorer fishing (24% improving, 23% same, 11% no opinion).

We asked an additional question to obtain the gut reaction of anglers to reducing the rainbow fishery. The reason was to provide some guidance in operation of the Hayden Creek weir to maintain the genetic integrity of the wild cutthroat population. Though we intend to reduce the impact of hybridization by not allowing hybrids and rainbow to spawn with cutthroat upstream, the option exists to return their progeny to lower Hayden Creek to rear. The question was worded, "Would you approve or disapprove of removal of rainbow to make Hayden exclusively a cutthroat lake?" Most people responded readily with an opinion. We explained the conflicts with cutthroat in the spawning/rearing stream in detail to those people who asked the reason for the question. The response from 142 interviews was 54% approval, 13% disapproval and 33% no opinion.

Considering the information available on the program it appears cutthroat enhancement with releases of hatchery-reared fish of the right stock has great potential to increase the population. Releases of the magnitude made so far have however produced a fishery with poorer success and much lower catches in 1979 than in 1968 when the fishery was supported mainly by releases of 15,000 catchable-size hatchery rainbow trout (15,690 hours fished, 5,955 rainbow, 591 cutthroat 0.42 trout/hr).

Table 2. 1979 Hayden Lake creel census.

Interval	Hours fished	KLCT	WCT	H	RB	All trout	Trout per hour
(1) 4/28-5/11	3898.3	34	69	105	191	399	.102
(2) 5/12-5/25	3973.9	57	218	83	28	386	.097
(3) 5/26-6/8	2760.0	17	89	62	0	168	.060
(4) 6/9-6/22	1005.1	0	10	0	0	10	.009
(5) 6/23-7/6	2379.4	12	54	26	12	104	.044
(6) 7/7-7/20	926.4	20	28	10	0	58	.062
(7) 7/21-8/3	1799.8	27	0	0	9	36	.020
(8) 8/4-8/17	810.1	0	0	0	0	0	.000
(9) 8/18-8/31	1161.8	9	9	0	0	18	.015
(10) 9/1-9/14	481.0	0	0	0	0	0	.000
(11) 9/15-9/28	556.8	0	24	8	0	32	.057
(12) 9/29-10/12	381.9	0	0	4	9	13	.034
(13) 10/13-10/26	297.4	57	11	0	34	102	.342
(14) 10/27-11/9	274.9	30	15	23	23	91	.331
(15) 11/10-11/30	81.4	3	3	5	3	14	.172
Total	20,788.2	266	530	326	309	1,431	.069

Angler dissatisfaction with hatchery rainbow was a primary impetus for exploring cutthroat restoration. In 1979 good fishermen often attained limits of 0.7-0.9 kg (1 1/2-21+b)trout in spring-fall periods on the lake. Anglers less familiar with the lake were regularly skunked throughout the season. At present the program has good support. However, unless the department is able to produce fish of the quality and numbers called for by program goals the fishery will likely not improve much.

Angler dissatisfaction would again be a logical consequence of a failure to fulfill the commitments made in the Hayden Lake management plan. If the size limit were raised considerably to protect most of the spawning populations (Fig. 2), this would also allow increased contribution of juvenile fish. Even then the miles of stream available for rearing will service to limit recruitment possible to some level below what the lake could support with a high-yield fishery maintained with hatchery assistance. Informal contacts with anglers who support the present regulation have given the indication this would however not be well received. Anglers seem to feel present regulations are sacrifice enough.

Fernan Lake Bass Investigations

Prior to 1979, bass regulations in Idaho were the most liberal in the United States (25 fish bag limit, no closed season). Restrictions on large fish (no more than 2 over 17 in) has little effect on harvest and serves primarily to distribute the harvest of large fish among anglers and eliminate the increasingly unacceptable practice of "gunny sacking."

With reduction in daily bass limits in 1979 to 10 fish, Idaho remains at the liberal end of the spectrum of 28 northern, midwestern and intermountain states. Bass limits in those states range from 5 (in 9 states) to a high of 15 (Montana) and an average of 7.6.

I have strongly suspected on the basis of our relatively infertile waters and cursory aging of large bass in the Panhandle that we probably have some of the slowest growing bass populations in the nation. This suspicion along with rapidly expanding interest in and promotion of our bass fisheries has been cause for concern regarding the future of those fisheries. Long-time residents complain of the diminished number of trophy-sized bass in our waters. We strongly suspect that the relative lack of exploitation in past years presented a situation where a few interested individuals had access to populations with large numbers of very old trophy-sized bass (9 yrs +).

Fernan Lake is a 300-acre (121.5 ha) lake situated virtually on the city limits of Coeur d'Alene. Although it receives annual releases of over 10,000 catchable-sized rainbow which provide a significant fishery, it is probably more popular for spiny-rayed species including largemouth bass, black crappie, yellow perch and pumpkinseed sunfish. Due to its proximity to a large population center, it probably receives more pressure per acre than any other lake in the region. Despite this effort, Fernan consistently provides good bass fishing. Fernan Lake is a convenient water to look at a representative North Idaho bass population and should serve as an excellent example of a population subjected to heavy exploitation for later planned comparisons with lightly exploited populations.

Between 14 June and 6 July 1979 we sampled bass in Fernan Lake using boat mounted electrofishing gear. We collected a total of 1,583 bass in 6 nights Of sampling. Fish were measured to the nearest 10 mm size class and representative subsamples weighed on spring dietary scales. Scale samples were taken from representative length groups for aging. All fish on the first four sampling trips were given an opercle punch mark using a 1/4-inch or 1/8-inch paper punch.

We estimated population size employing Peterson mark-and-capture techniques described by Ricker (1958).

Our gear was not efficient in collecting bass under 100 mm. Therefore our population estimates represent fish 2 years of age and older. Bass greater than 350 mm in length have the swimming power to escape the electrical field of our gear and our samples of those size fish were small. We therefore probably underestimated numbers of bass of that size. Since our electrofishing equipment is ineffective in depths over 3 m our sampling was limited to the littoral zone. Acceptance of our population estimate requires the assumption that all fish utilize the littoral zone and thus marked fish become randomly distributed in the population sampled for marks.

We estimate a population of 11,085 bass 2 years of age and older (95% C.I. = 8,229-13,927). Seventy-three percent of the bass we sampled were age 2+ and between 90-120 mm in length (Fig. 4). Through scale analysis we arrived at mean length for each age class. Growth of bass in Fernan Lake is slower than that reported for most North American lakes and reservoirs (Table 4) (Fig. 5). From age frequency information we calculated total annual mortality to be 0.48. This appears to be moderate when compared to other North American waters (Table 3).

Using length frequency information and weights from our samples, we calculated the standing crop of bass in Fernan Lake to be 91.2 fish/ha or 7.2 kg/ha (for fish 2+ and older). The mean standing crop of bass in North American lakes and reservoirs has been reported by Bennett (1971) to be 16.8 kg/ha.

It appears that it may be difficult to maintain a quality or a trophy bass fishery in Fernan Lake under current regulations. Growth is extremely slow. Bass do not reach a size desired by anglers, 305 mm (12 in) until 5 years of age and do not reach trophy,2.3 kg (5 lb),size until at least 10 years of age. Large bass are thus subjected to angling mortality for 5 years. We estimate that bass over 305 mm (12 in) represent 4.2% of the population.

Although total annual mortality appears moderate compared to other North American waters, it is significant when you consider the slow growth of the population. If you apply Fernan mortality rates to a theoretical population of 500, 305-mm (12-in) bass (which in Fernan are about 5 years old) up to age 10 when Fernan bass reach 2.3 kg (5 lb), you can see we don't end up with many 2.3-kg (5-lb) bass:

Age	Number
5	500
6	250
7	125
8	62
9	31
10	15

Table 3 . A comparison of total annual mortality rates in Fernan Lake and other North American waters.

Water	Annual Mortality
Sugarloaf Lake, MI	0.70
Whitmore Lake, MI	0.42
Clear Lake, CA	0.56
Browns Lake, WI	0.24
Gladstone Lake, MN	0.61
Fernan Lake, ID	0.48

Table 4. Comparison of largemouth bass growth from various waters.

Location and Citation	Total length (in.) at each annulus										
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Fernan Lake Present Study	2.5	5.3	7.4	9.5	11.4	12.8	14.2	15.6	16.9	17.5	19.3
Lewis Smith Reservoir Webb & Reeves (1974)	5.8	10.8	14.1	15.8	17.4	19.1	20.4	21.5	22.4	23.6	
Grenada Reservoir, Mississippi Towery (1962)	6.1	11.0	33.3	15.0	17.2	19.7	21.4				
Wisconsin 17 Lake Average Mackenthum (1948)	6.5	8.0	10.1	11.3	12.5	14.6	16.0	16.9	18.4	19.4	19.8
Oklahoma Average Jenkins and Hall (1953)	5.5	9.7	12.5	14.9	17.1	18.6	19.9	20.9	22.6		
Folsom Lake, California Tharratt (1966)	5.6	10.4	12.8	14.5	15.8	17.0					
Lake Hamilton, Arkanass Hulsey and Stevenson (1958)	5.9	9.9	13.1	17.6	20.7						
Lake Cumberland, Kentucky Carter (1967)	6.7	10.4	14.1	18.5							
Hiwassee Reservoir, North Carolina Stroud (1949)	5.6	10.2	12.9	14.3	15.2						
Nrrris Reservoir, Tennessee Stroud (1948)	6.9	12.4	14.7	16.1	17.5	19.3	20.8				
Lake Wappapello, Missouri Patriarche (1953)	5.4	10.9	13.3	16.1	18.1	19.6					
Claytor Lake, Virginia Rosebery (1950)	7.0	10.8	14.0	15.9	16.8	17.8					

Table 4. Continued

Location and Citation	Total length (in.) at each annulus										
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Reelfoot Lake, Tennessee Schoffman (1953)	---	9.3	11.1	13.3	14.7	16.8	18.2	20.3	20.6	22.0	
Kentucky Average, 6 Lakes Tompkins and Carter (1951)	5.9	11.5	14.5	15.6	19.0						
Beaver Reservoir, Arkanass Bryant and Houser (1971)	6.0	10.9	13.1	15.6	18.2	18.7					
Quabbin Reservoir, Massachuetts McCaig and Mullan (1960)	4.0	9.2	12.8	15.0	16.4	17.5	18.4	18.8	17.3		

[1]Mean calculated fork length.

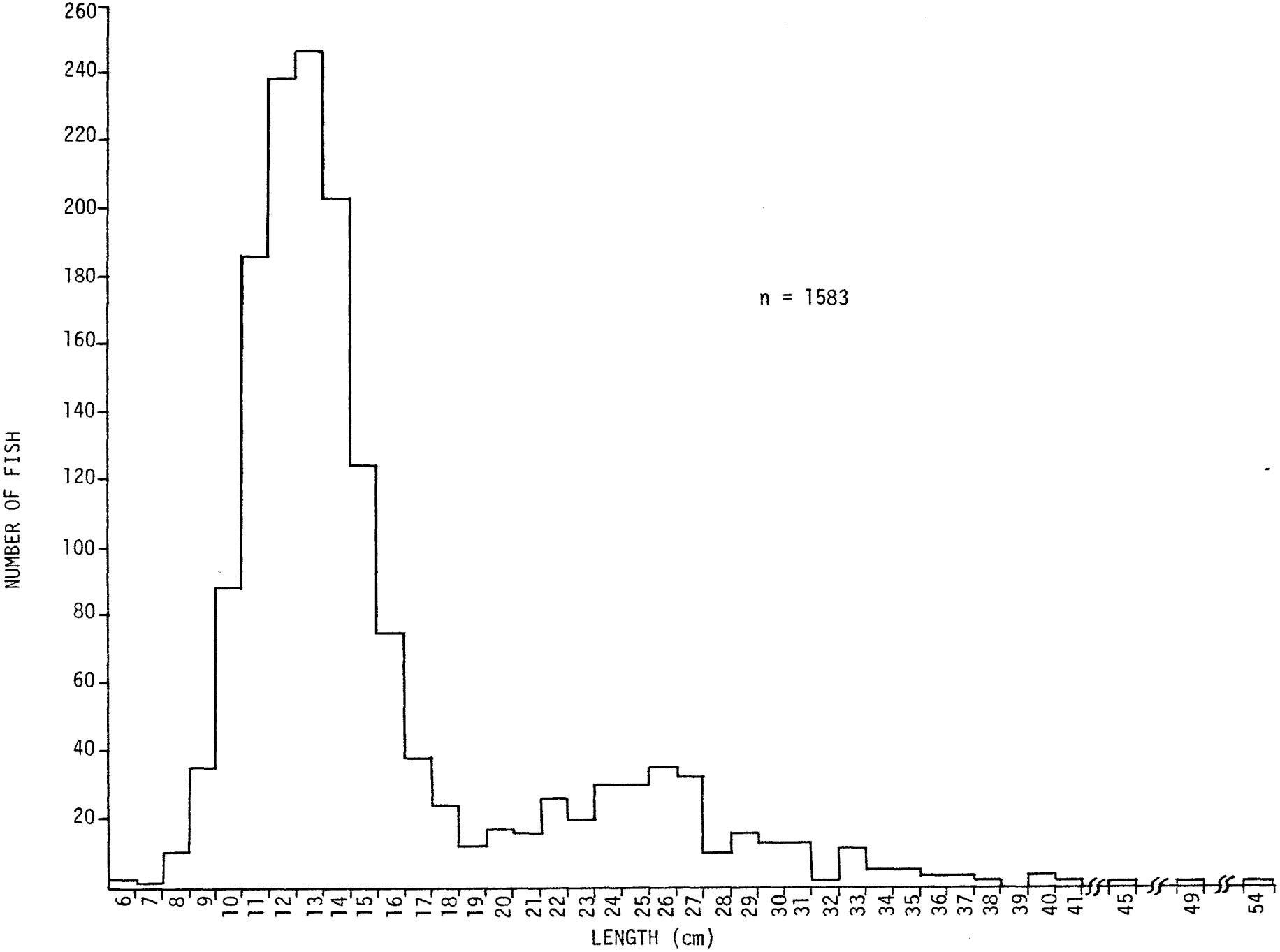

Figure 4. Length-frequency of largemouth bass collected in electrofishing samples from Fernan Lake, 13 June 7 July 1979.

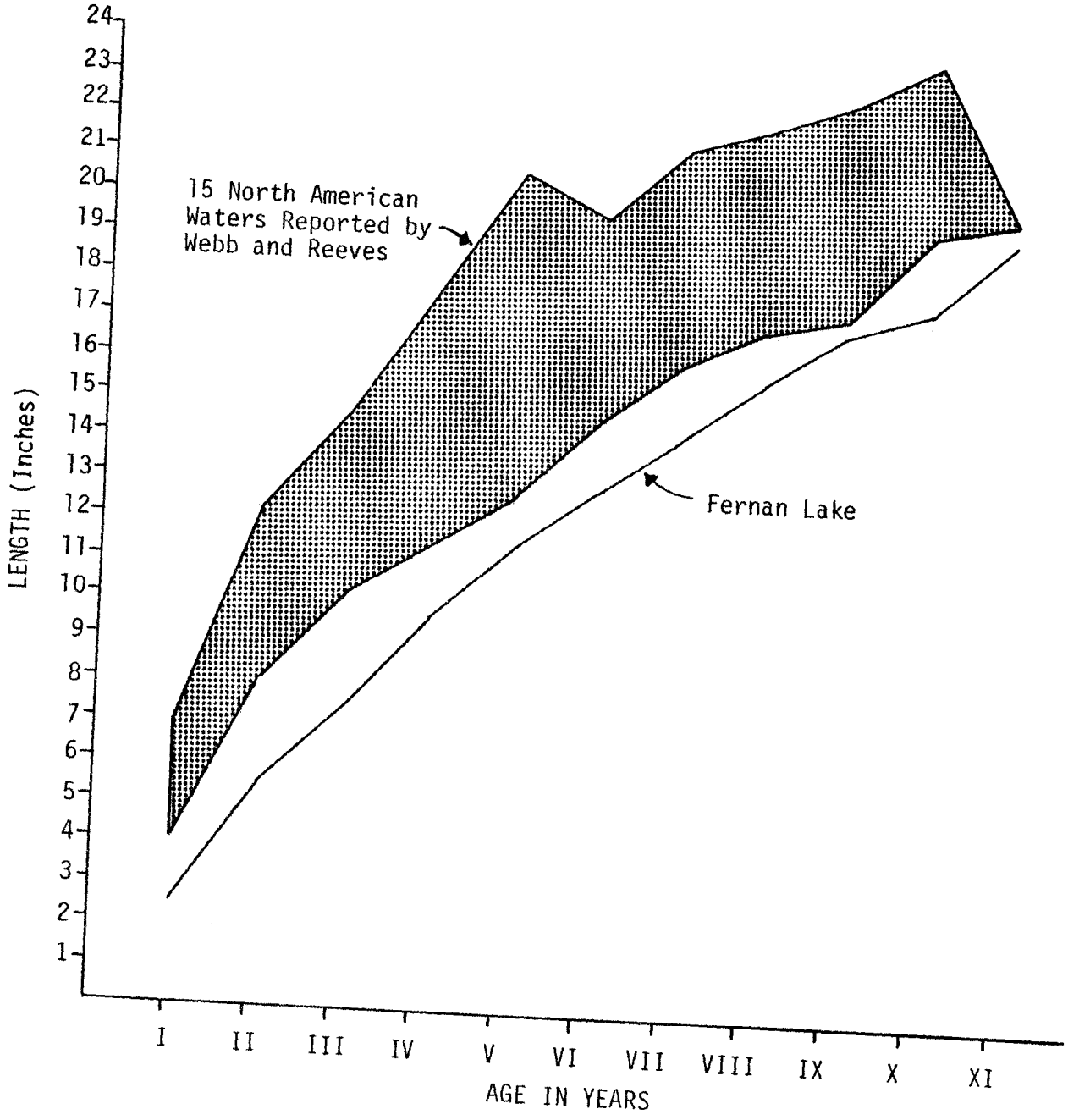

Figure 5. Comparison of growth of largemouth bass in Fernan Lake with a range of growth in 15 North American waters reported by Webb and Reeves (1974).

Newburg (Minn., rept. No. 335) reported densities of largemouth in some northern lakes to be 26.1 fish per acre. On Fernan Lake we have 36 bass per acre. However the standing crop of bass in Fernan is only 7.2 kg/ha compared to an average for North American lakes reported by Bennett of 16.8 kg/ha. The low standing crop in Fernan can be attributed to the dearth of individuals over 305 mm (12 in) which contribute most to standing crop.

I suspect that a large proportion of total annual mortality of fish over 305 mm (12 in) is fishing mortality. If so, any number of options for restrictive length and/or bag limits could affect different results. Certainly the number of 2.3-kg (5-lb) bass in the population could be increased by reducing mortality on any segment of the age 5-10 age group of bass--most effectively through length limits. We hope to enhance our information on the strength of the catchable segment of the population in 1980 by augmenting electrofishing samples with hook and line samples. We also plan repeated mark and recapture population estimates, additional scale collection and analysis to augment age information, and extensive tagging and creel census to estimate fishing mortality.

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JOB PERFORMANCE REPORT

State of Idaho Name: REGIONAL FISHERY MANAGEMENT INVESTIGATIONS

Project No. F-71-R-4

Title: Region 1 Stream Investigations

Job No. I-c

Period Covered: 1 January 1979 to 31 December 1979

ABSTRACT

We sampled the Little North Fork of the Clearwater River in 1979 by hook-and-line and found a drastic change in size distribution of wild rainbow from similar samples collected in 1973. The changes are thought to be due to elimination of anadromous steelhead from the drainage subsequent to construction of Dworshak Dam.

A non-systematic creel census was conducted on the Spokane River from Post Falls Dam to the Washington stateline. Snorkeling observations were also made to assess distribution and abundance of rainbow trout. The Spokane River contains a healthy, self-sustaining population of rainbow trout including individuals of trophy size. Evidence to date does not indicate rainbow populations are endangered by current levels of angling pressure.

We sampled fish and benthic insect populations in the South Fork of the Coeur d'Alene River below the proposed Hecla Mining Company discharge point. We found excellent cutthroat trout populations and our insect samples had a high species diversity both indicating a high quality aquatic habitat.

Author:

William H. Goodnight
Regional Fishery Manager

RECOMMENDATIONS

1. Conduct snorkeling and test angling to assess brown trout introductions in the lower Priest River.

2. Conduct population sampling and snorkeling transects on the Spokane River to assess the status of wild rainbow populations.

3. Snorkel established transects on the Moyie River to evaluate the status of wild rainbow populations.

4. Snorkel established transects on the upper Coeur d'Alene River and upper North Fork to assess response of cutthroat populations to restrictive regulations instituted in 1975.

OBJECTIVES

Monitor fisheries on major streams in Region 1.

TECHNIQUES USED

We used hook-and-line sampling, creel census and electrofishing to obtain information on major fisheries in Region 1.

FINDINGS

Little North Fork Clearwater River

The Little North Fork of the Clearwater River is the last major river system in northern Idaho which is largely unroaded and is managed under general trout seasons and limits. It is our management goal to provide consumptive fisheries without special restrictions where biologically feasible. In order to insure that our management direction on the Little North Fork does not result in the depletion of wild trout populations, and to provide data for a land exchange proposal, we sampled fish populations of the Little North Fork by hook-and-line in mid-July 1979. Similar hook-and-line sampling was conducted in mid-August 1973 by regional personnel.

In 1973, 75.3% of our catch was wild rainbow trout and 20.2% cutthroat. Since then, species composition appears to have shifted considerably. In 1979 we caught 55.2% rainbow and 41.9% cutthroat. The size distribution of wild rainbow in our catch changed dramatically. Modal size of rainbow caught in 1973 was 230 mm (Fig. 6) and mean size was 244 mm. In 1979 modal size was 170-180 mm and mean size was 179 mm. Also noticeable in 1973 was the absence of rainbow smaller than 180 mm in the catch, while in 1979 we collected rainbow as small as 110 mm. These apparent dramatic changes in rainbow populations can be theoretically explained by the closure of Dworshak Dam in the fall of 1971 and exclusion of adult steelhead from the North Fork Clearwater drainage beginning in 1970. Adults passed upstream in the fall of 1969 were the last steelhead with the opportunity to spawn in the Little North Fork in the spring of 1970. Those wild rainbow caught in 1973 which averaged 244 mm

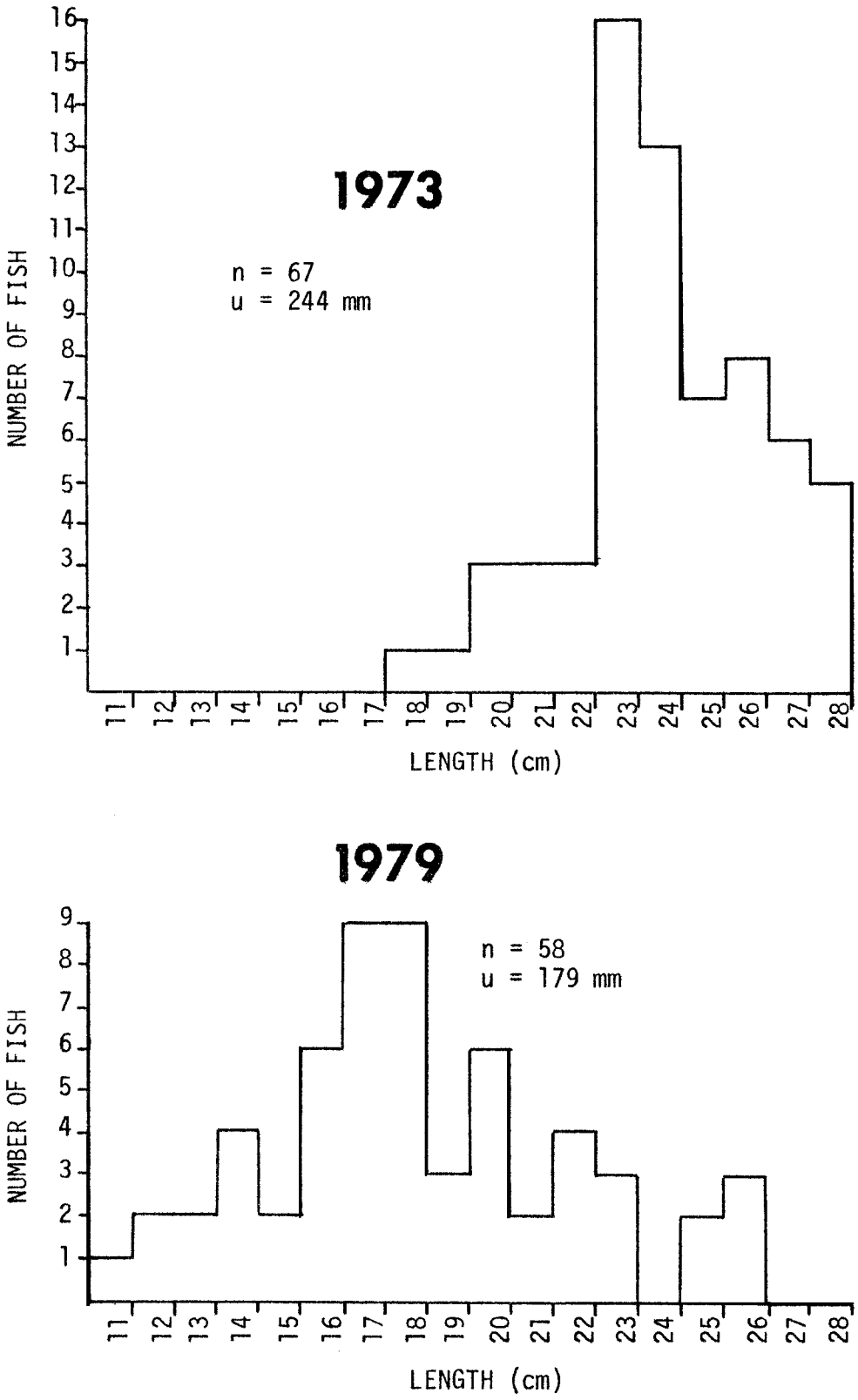

Figure 6. Length-frequency of wild rainbow collected by hook-and-line from the Little North Fork of the Clearwater River, mid-August 1973 and mid-July 1979.

in length should have been primarily 3+ juvenile steelhead. The absence of fish smaller than 180 mm in 1973 could be explained by the lack of steelhead spawning in 1971 and 1972. Those wild rainbow caught in 1979 could represent: 1) resident stocks previously suppressed by anadromous stocks; 2) residual anadromous stocks; 3) results of reservoir fingerling plants; 4) and/or any combination of the above. The reduction of modal length of fish in the harvest could represent competition between age classes in 1979 coupled with increased inter-specific competition with cutthroat as a result of their apparent enhancement since 1973.

There appear to be more cutthroat in the Little North Fork than we observed in 1973. Their size structure has not apparently changed. Modal length of fish caught in 1973 and 1979 is the same (220 mm) (Fig. 7). Cutthroat appear to have responded positively to removal of steelhead and **in** 1979 represented 41.9% of fish sampled while in 1973 only 20.2% of the fish we caught were cutthroat.

Spokane River Investigations

In response to concern expressed by local fly fishermen about the well-being of wild rainbow populations in the Spokane River and the possible impact of year-round fishing on those populations, we instituted general season regulations for the Spokane River for 1979 including a normal winter closure (1 November - 23 May).

Although the public was notified of our intention to close the winter fishery, and were given the opportunity to voice their objections at our public meeting on 11 October 1978, only one person voiced opposition and two people supported the closure.

Public awarness of the closure grew with distribution of the 1979 regulations pamphlet and it became obvious there was considerable public opposition to the closure. In order to better assess the status of rainbow populations in the Spokane River and the probable impact of exploitation on that resource, and to provide the Commission with sound recommendations for 1980 regulations, we instituted studies in the summer of 1979. They included a non-systematic creel census to assess effort and harvest levels, and test fishing and snorkeling to ascertain population levels.

The river reach involved is the 7.2 km (4.5 mi) between Post Falls Dam and the Washington state line. Between 26 May and 15 August we counted anglers on this reach and on 17 trips we counted an average of 10 anglers per count. We observed most of the anglers concentrated at 5 major access sites and we estimated 85% of the angling effort occurred on 17% of the river length.

We interviewed 107 anglers who fished 137 hours and caught 14 trout for a catch rate of .10 fish per hour. However few of our interview trips were in the late evening when catches are considerably better. Department personnel fishing with flies at sunset in late August caught twenty-four 200-360 mm (7.9-14.2 in) rainbow in 5 hours of fishing (4.8 fish/hr).

We snorkeled four selected river sections on 6 September and observed 54 rainbow trout and 3 brook trout in 700 mm (766 yd) of stream (Table 5). Twenty-

Table 5. Snorkeling observations on four selected Spokane River sections on September 6, 1979.

Transect number	Location	Length meters)	Observations
1	From bridge on north channel, 200 meters downstream	200	17 Rainbow -4 over 300 mm -1 over 380 mm 3 Brook trout (all about 250 mm) Also observed, suckers, dace, yellow perch, pumpkinseed sunfish and largemouth bass.
2	From USGS gaging station at McGuire, 300 meters upstream	300	23 Rainbow up to 400 mm -13 over 300 nun
3	Rapids just above Corbin Park	100	10 Rainbow -4 about 100 mm -4 over 300 mm up to 400 mm Very fast - no time to see - count minimum.
4	Just above Jacklin Seed Company below Pleasant View Bridge - run on south curve	100	4 Rainbow -1 over 300 mm Very fast - no time to see - count minimum.
Total			57 Trout -22 over 300 mm

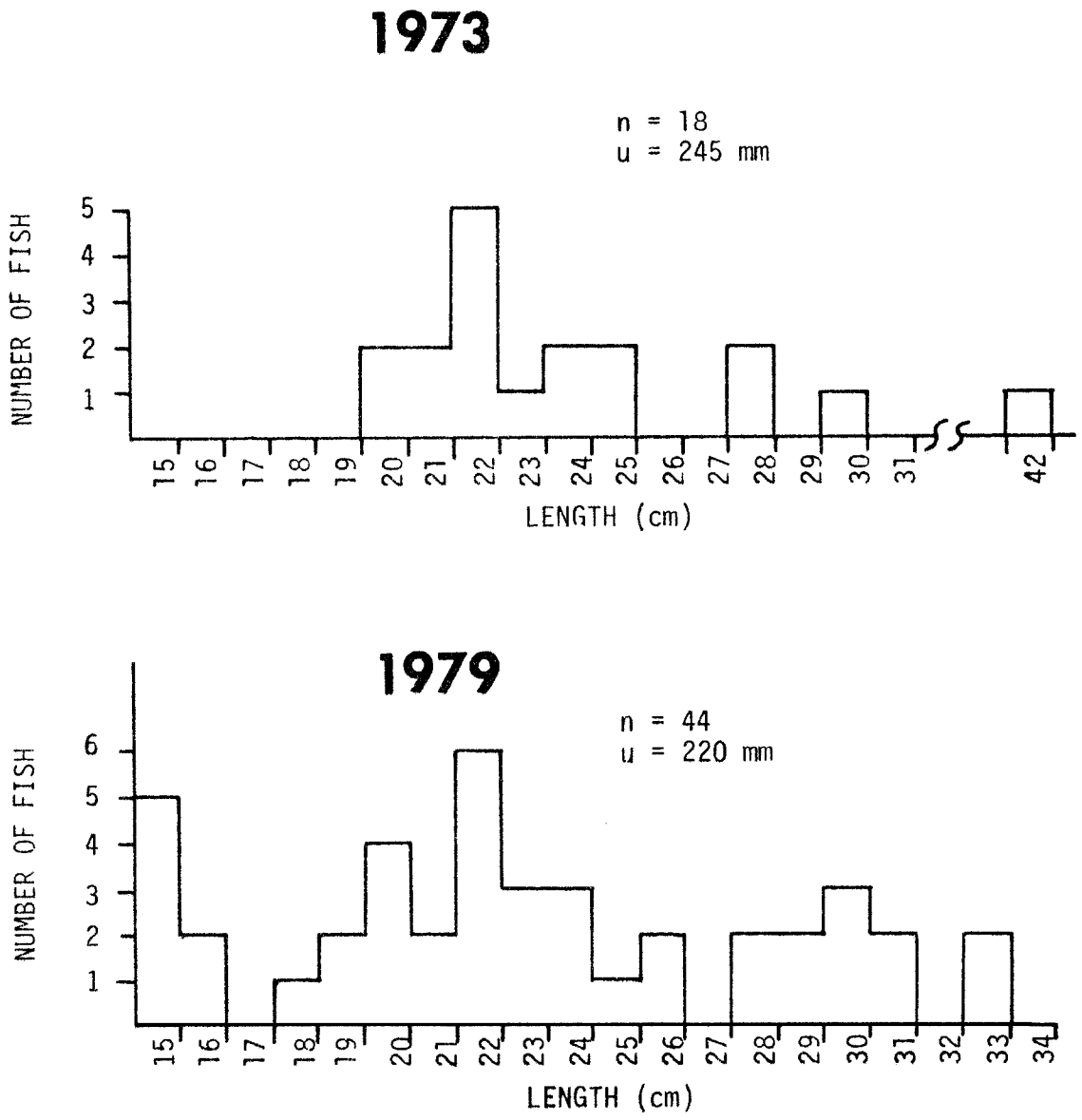

Figure 7. Length-frequency of cutthroat trout collected by hook-and-line from the Little North Fork of the Clearwater River, mid-August 1973 and mid-July 1979.

two of the rainbow observed were in excess of 300 mm (about 12 in). These observations are absolute minimum density indicators since visibility is limited by water transparency and our visual field covered no more than 30% of the stream width. I would estimate then a minimum density of 244 trout per stream kilometer.

In late dune we observed large numbers of young-of-year rainbow trout along the shoreline in the middle channel below the powerhouse, which indicates successful reproduction.

The rainbow we observed appear to be in excellent condition and exhibit good growth, attaining 355-460 mm {14.0-18.1 in) in length by maturity at 4 to 5 years of age. Larger rainbow were found to utilize yellow perch and one 470 mm (18.5 in) 4 year-old spawned-out female was found to have four 100-200 mm (4.0-7.9 in) perch in her stomach. We documented large fish **in** the harvest including 2 rainbows 560 and 600 mm (22.0 and 23.6 in) long weighing 2.5 kg and 3.0 kg (5.5 and 6.6 lb) respectively.

The Spokane River contains a healthy, self-sustaining population of wild rainbow trout including individuals of trophy size. Angler effort is low and concentrated primarily on a minor portion of the river. Angler expertise appears to be minimal with only a small proportion of effort expended by serious fishermen. We do not feel that evidence to date indicates that trout populations are endangered by current levels of angling pressure.

A complete systematic creel census will be conducted by Washington State University during 1980 to obtain accurate estimates of use and harvest in both the Idaho and Washington reaches of the river. Population sampling will also he conducted including mark and recapture population estimates and assessment of fish movement.

South Fork Coeur d'Alene River ___ - Hecla Mining Company Discharge

During 1979 we spent considerable time providing comments on a proposed NPDES discharge permit for Hecla Mining Company. The proposed discharge has been tentatively approved by the Idaho Department of Health and Welfare with effluent limitations for cadmium and zinc which at low flows would approach lethal levels for salmonids. In the event we are not influential in modifying the limitations to levels which will insure protection of aquatic life, we want to be able to document changes in fish and insect populations.

On 11 October we electrofished a section of the South Fork immediately below the proposed discharge point. The sampling involved two passes with a Georator 230 v,d.c., 500 watt electrofishing unit and every attempt was made to capture all salmonids encountered. Cottids were collected as encountered but we did not attempt to capture 100%. I would estimate our efficiency as 80% for salmonids and 30% for cottids. We found 16 cutthroat, 6 rainbow and 3 brook trout in approximately 100 m (109 yd) of stream. We also collected 31 cottids (Table 6).

We also collected three square foot (.0929 m^2) bethos samples using a surber sampler. These samples were analyzed by the Idaho Department of Health and Welfare, Division of Environment laboratory in Boise. Those samples

Table 6. Length of fish in electrofishing sample from the South Fork of the Coeur d'Alene River below Lindross Pond, October 11, 1979.

Species	Total length of specimens (mm)					
Rainbow trout	280	208				
	202	236				
	247	223				
Brook trout	287					
	246					
	256					
Cutthroat trout	113	173	202	172		
	142	190	154	170		
	224	125	125	122		
	156	170	222	61		
Cottus sp._	49	109	52	87	42	43
	82	93	103	70	70	60
	102	85	85	98	75	92
	98	83	85	88	63	45
	73	60	60	65	45	52
						42

represent a healthy benthic community, indicating a high quality aquatic habitat. The three samples had an average Shannon-Wesley diversity index of 3.79 (Table 7).

Table 7. Macro-invertebrates found in 3,ft^2 samples collecting in the South Fork of the Coeur d'Alene River, 100 ft above the county road bridge at Deadman Gulch on 11 October 1979.

Organisms	Number in sample # 1	2	3
Diptera			
Tipulidae			
Hexatoma	3	2	2
Anatocha	4	10	15
Chironomidae			
Cricotopus		3	
Trichoptera			
Brachycentridae			
Brachycentrus	5	2	3
Hyclropsychidae			
Para psyche	14	3	4
Arctopsyche	34	11	11
Hydropsyche	16	12	10
Glossosomatidae			
Glossoma	19	25	8
Rhyacaphilidae			
Rhyacaphila	5	6	1
Philopotamidae			
Dolophilodes	1		
Limnephilidae			
Apatania		1	
Leptoceridae			
Nectopsyche		1	
Plecoptera			
Chloroperlidae			
Utaperla	11	17	14
Ephemereilidae			
Ephemerella	21	26	17
Baetidae	5		7
Heptageniidae			
Rhithrogena	4	5	2
Epeorus	4	3	2
Stenonema	9	11	13
Leptophlebioidae		2	
Coleoptera	1	3	3
Elmidae			
Hetevlimnius	5	3	3
Gastropoda			
Physa		1	
Total organisms	160	144	112
Total Taxa	19	21	17
Shannon-Weaver Diversity Index	3.78	3.87	3.72

JOB PERFORMANCE REPORT

State of Idaho Name: REGIONAL FISHERY MANAGEMENT INVESTIGATIONS

Project No. F-71-R-4 Title: Region 1 Technical Guidance

Job No. I-d

Period Covered: 1 January 1979 to 31 December 1979

ABSTRACT

Region 1 management personnel provided private individuals, organizations and state and federal agencies with technical guidance and advice on projects associated with or having impacts on the fishery resource or aquatic habitat in Region 1. This guidance included written comments on 208 documents.

Authors:

William H. Goodnight
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Gregg R. Mauser
Regional Fishery Biologist

OBJECTIVES

To provide technical guidance to public and private individuals or agencies on matters pertaining to fisheries within Region 1.

TECHNIQUES USED

Through personal contact, project and document review and field inspections, we made comments and provided advice on projects or activities associated with or impacting the fishery resource or aquatic habitat of the region.

FINDINGS

During 1979, Region 1 management personnel responded to 208 written requests for comments from state and federal agencies including:

US Bureau of Land Management	1
US Corps of Engineers	55
US Forest Service	5
US Environmental Protection Agency	4
Idaho Department of Lands	63
Idaho State Clearing House	38
Idaho Department of Transportation	4
Idaho Department of Water Resources	20
Miscellaneous	18
Total	208

We also attended 11 meetings with agencies, groups and individuals to present department concerns regarding fish and wildlife values. Innumerable telephone contacts were also conducted.

During 1979 regional personnel attended 28 sportsmen's meetings as department representatives and gave 18 formal presentations to schools, civic groups, sportsmen and environmental organizations.

During 1979 Goodnight participated as a member on the Kootenai County Lake Task Force which developed recommendations for ordinances governing lake encroachments and shoreline development on Coeur d'Alene Lake.

Mauser arranged meetings with hatchery personnel, assembled information, and compiled several drafts of operating plans for hatcheries in Region 1. Routine work with hatchery personnel is a necessary and enjoyable cooperative activity for management personnel year-round. Considerable effort was expended this year to help generate diagnoses and solutions to an outbreak of IPN at Clark Fork Hatchery in late summer. Steps were proposed to prevent infection of other hatcheries and spawn-taking operations.

Submitted by:

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Regional Fishery Manager

Gregg R. Mauser
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Approved by:

IDAHO DEPARTMENT OF FISH AND GAME

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